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**SHEDDING LIGHT
ON A HIDDEN
HEART DISEASE**

ALSO IN THIS ISSUE...

Annual Report Listing

Penn Vet's Role in
Protecting Public Health

Opening of the Penn Vet
Working Dog Center

2012 Student
Inspiration Awards

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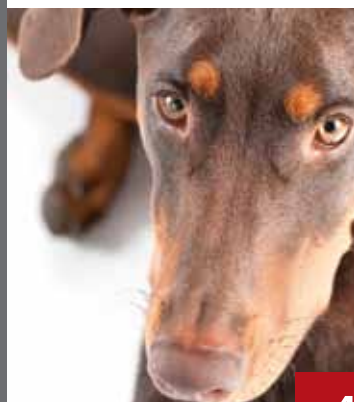
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ABOUT THE COVER:

Mark Oyama, DVM, with Stanley, a Doberman. Dr. Oyama, a professor of cardiology at Penn Vet, is working to ensure a heart disease, commonly found in Dobermans, is controlled as effectively as possible.



HENDRICKS

As I write this, summer is coming to a thankfully cooler close. But while summer brings thoughts of long, lazy days, this summer Penn Vet was alive with activity. There is no off season for us.

In the short three months of June, July and August, we celebrated the advent of the Class of 2016 as well as the career – so far! – of Ralph L. Brinster, VMD, PhD with a two-day symposium in his honor, which welcomed brilliant scientists from around the globe who have been impacted by Dr. Brinster's work. And, of course, we are off to a running start with fall classes.

We are also on the brink of closing the extraordinarily successful \$125 million Making History campaign in the face of an unprecedented economic collapse that was in full swing the week we had our launch celebration in 2008. Our students, faculty, staff – and new as well as established buildings and programs – are sustaining and catapulting our record of excellence into the future.

The end of summer is a reflective time every year, and this year the combination of celebrations of the past and future evokes the thought that “past is prologue.”

Our present is determined by our history – and our future builds on where we are today.

We are fortunate to have the history of vision, wisdom and excellence embodied by Dr. Brinster. It is fitting that his own work focuses in exquisite detail on the origins of mammalian life in the germ cell and early development because of his impact on Penn Vet. His line of work and his example of excellence might be said to have set the course of development of the entire institution as an integrated unit where fundamental scientific discoveries are applied to improving the health of animals and the people who depend on them.

But Dr. Brinster was not alone in helping to set the tone for Penn Vet. It is clear that the vision of the leaders of the 1950s made possible not only superb basic science in a veterinary context, but also the innovations in teaching and the development of science-based clinical specialties that have been crucial in advancing the level of care and improved lives for non-human patients.

In looking back on our history we also can see the remarkable innovations of Dr. Leonard Pearson, whose triumph over bovine tuberculosis was a national and international model; the work of Dr. Evan L. Stubbs on avian influenza and avian leukemia that carries us into the present day; the globally important work of politically active veterinarians such as Dr. Martin Kaplan, who was a leader of the Nobel Peace-Prize-winning Pugwash

Movement, to see that the seeds of our growth were sown early and nurtured throughout our development.

And this tradition of integration and excellence continues.

As you will see from our Student Inspiration Award winners, the vision, creativity, energy and boldness is a fitting legacy for the prologue represented by the School's luminaries of the past.

You'll also notice how our faculty are continuing to change the face of veterinary medicine. Our cover story for this issue of *Bellwether* focuses on Mark Oyama and his work to better understand and better treat a devastating heart disease often found in large-breed dogs, including Dobermans.

“We all were sea-swallow'd, though some cast again,
And by that destiny to perform an act
Whereof what's past is prologue, what to come
In yours and my discharge.”

—Shakespeare's *The Tempest*, Act II Scene I

Similarly, in our feature about public health, you can see that beyond the clinic our faculty are continuing to work towards a common good for both people and animals with the work they are each doing in rabies, leishmaniasis and MRSA.

Finally, on pages 18-19, you'll see several photographs from the recent opening of the Penn Vet Working Dog Center – the brainchild of Cynthia M. Otto, DVM, PhD. After responding to the attacks of September 11, 2001 to serve the working dogs who were called to duty, Dr. Otto set her sights on following the health of these dogs as well as working to ensure the health and safety of future generations of working dogs. This September 11 we celebrated the opening of the center with seven puppies to be the first class of dogs trained as well as with three dogs who were on the ground in New York in 2001.

As the final phase of our Making History campaign, we are literally engraving in stone the names and/or sentiments of faculty, staff, donors and friends who wish to purchase pavers on the Philadelphia or New Bolton Center campuses. The stones are beautiful granite and the ability to leave a permanent written legacy is precious. In honor of all that is past – and in hopes for the future that is “in yours and my discharge,” I have decided to dedicate the paver I am purchasing “in honor of Penn Veterinary leaders—past, present, future.”

—JOAN C. HENDRICKS, V'79, GR'80
THE GILBERT S. KAHN DEAN
OF VETERINARY MEDICINE



SHEDDING LIGHT ON A HIDDEN DISEASE

BY KATHERINE UNGER BAILLIE

Doberman pinschers are stately, strong and intelligent, seemingly unflappable. Yet members of this breed are more likely than any other to succumb to an insidious, inherited condition that can silently kill.

Dilated cardiomyopathy (DCM) is the second most common acquired heart disease seen in dogs, behind mitral valve disease. It's particularly prevalent in Dobermans.

"As many as 40 percent of Doberman pinschers are going to get dilated cardiomyopathy at some point in their life," said Mark Oyama, DVM, a professor of cardiology at Penn Vet. "So clearly it's a big problem for the breed."

DCM, which is typically an inherited condition in canines, also commonly strikes other large breeds such as Irish Wolfhounds and Great Danes. Fortunately for these dogs and their owners, Dr. Oyama is one of a growing number of researchers with a goal of finding better ways to screen and treat pets that have or are likely to develop DCM.

Among the challenges of this pursuit is the disease's hidden nature.

"Oftentimes a dog will be developing or have dilated cardiomyopathy and yet show no outward signs of it," said Dr. Oyama. "So you have owners who think their dog is completely normal and yet they're walking around with heart disease."

Sometimes, the first overt sign that a dog has DCM is it suddenly collapses and dies. But many dogs do display symptoms, which may include labored breathing, coughing,

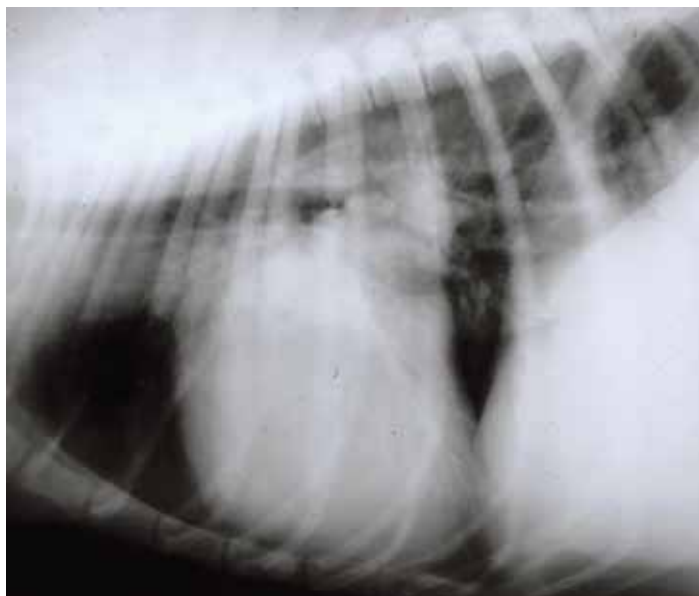
fainting, exercise intolerance, restlessness and lethargy. All of these result from the central feature of DCM, which is the weakening of the heart muscle.

While researchers don't fully understand the mechanism of disease, they do know it has to do with a malfunction in the way that heart muscle cells operate at their fundamental or cellular level. As a result of these disruptions on the molecular and cellular levels, the chambers of the heart dilate and their walls thin. The heart's pumping action weakens and fails to adequately circulate blood through the body. This, in turn, leads to congestive heart failure.

Sudden cardiac death can occur without any previous symptoms because a heart damaged by DCM may beat in an abnormal rhythm and arrest. The disease can be devastating for dog owners who would have otherwise expected to have several more years with their pet; DCM can strike Dobermans as young as two years old and most dogs die within a year of diagnosis.

TOWARD EARLY DIAGNOSIS

Currently, the gold standard for DCM diagnosis is to perform a cardiac ultrasound (echocardiogram) and to monitor the heart rhythm for 24 hours with an ambulatory electrocardiogram, known as a Holter monitor. These screenings are not inexpensive and while the expense may be justifiable for the owner of a single Doberman, it could be prohibitive for breeders who may wish to screen many dogs at once.



An X-ray of a dog's heart with DCM.

The stakes are high for early diagnosis, because veterinarians can intervene with drugs such as pimobendan, beta-blockers, diuretics and ACE inhibitors that can slow the disease's progression. Thus, much of Dr. Oyama's research on DCM has focused on developing more accurate and less expensive ways to diagnose the disease.

"One of the things that we looked at most recently is trying to find out if you could do a blood test that would help you decide if your dog has a high likelihood or a low likelihood of having cardiomyopathy," said Dr. Oyama. "That would provide a kind of middle ground between doing nothing and doing a full-blown diagnostic workup."

In a publication just out in the *Journal of Veterinary Internal Medicine*, Dr. Oyama and former Penn Vet resident Gretchen Singletary, now a veterinary specialist at Cornell University Veterinary Specialists, along with colleagues, describe a blood test that can help discern whether a dog is in the early stages of DCM. Examining 155 asymptomatic dogs, the researchers measured blood concentrations of N-terminal pro-brain natriuretic peptide, or NT-proBNP. The heart releases this peptide when it is under stress, and other researchers have used it as a marker of cardiac dysfunction in humans.

In the study, the researchers found that dogs with high levels of NT-proBNP were more likely to have DCM and had much shorter survival times than those with lower levels. This assay alone, however, did not always reliably predict a dog's likelihood of being diagnosed with DCM without an ECG. A solution to the lack of sensitivity was to pair the blood test with



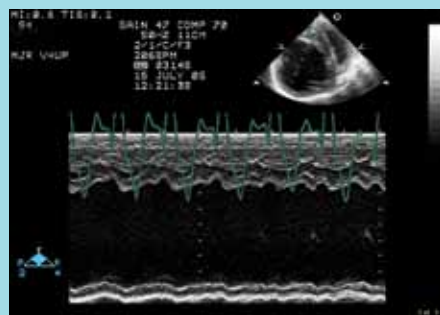
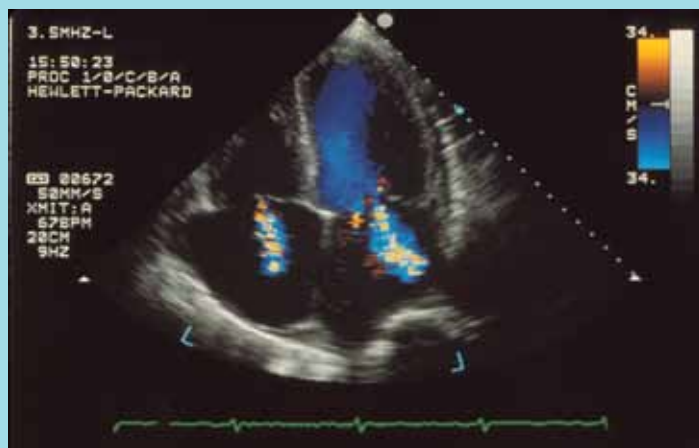
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TREATING HEART DISEASE WITH GENES

While Dr. Mark Oyama seeks better ways to determine whether or not a dog has dilated cardiomyopathy (DCM), Meg Sleeper, VMD is refining approaches to treating DCM and other heart conditions that may restore near-normal function to the heart muscle. What she finds may reach beyond the veterinary profession to improve human lives as well.

For nearly a decade, Dr. Sleeper, associate professor of cardiology, has worked with colleagues at Penn and elsewhere to develop gene therapy techniques to treat cardiac disease in dogs and cats. Gene therapy aims to correct disease-causing genetic abnormalities by using a non-pathogenic virus to “infect” specific cells in a patient with a healthy version of a gene.

One beauty of the approach is that researchers needn’t understand the exact molecular pathway that goes awry — and for DCM, scientists don’t yet have this detailed knowledge. Instead, they can zoom to the end of the pathway, correcting the ultimate problem. For DCM, that means targeting the protein pump that shuttles calcium in and out of cells. Using gene therapy that helps boost levels of calcium inside the cell, researchers can ensure the heart muscle maintains strong contractions, staving off congestive heart failure.



Cardiac ultrasound of a dog with DCM.

“With gene therapy what we’re doing is trying to get the heart muscle to produce a protein of interest,” said Dr. Sleeper. “So instead of having to give a drug every day, the muscle cells just produce the molecule, in essence becoming the drug manufacturer for us.”

Two different genes have functioned as these genetic “drugs” in Dr. Sleeper’s early trials. One, called S100A1, enhances calcium movement into heart muscle cells. The other blocks the activity of the gene phospholamban, which normally reduces movement of calcium into cells. The initial tests, conducted in about 60 dogs, look promising.

“With the studies we’ve done so far we can get about 60 to 70 percent of the heart cells to express the genes we’re introducing,” she said. “I’m hopeful that that is enough for a dog with DCM to experience a big difference in their heart function.”

This initial phase of testing has also shown that the treatment is safe in a variety of canine breeds, most of which did not have DCM. Dr. Sleeper now has grant applications submitted with the hope of experimentally treating Dobermans that do have DCM. Not only might success in these trials bode well for dogs with DCM, but also in humans with DCM and other heart conditions.

“If it turns out that we get really great results with either phospholamban or S100A1 or both, then I think that gives researchers really useful information for treating humans,” Dr. Sleeper notes.

In people, DCM can be inherited but can also develop after a heart attack or coronary disease. DCM can also be one symptom of Duchenne muscular dystrophy, which affects one out of every 3,500 boys and is caused by a mutation in the dystrophin gene. Together with Lee Sweeney, PhD, the William Maul Measey Professor and chairman of physiology at Penn Medicine, and others, Dr. Sleeper has used gene therapy to correct the problem in the muscle tissue of dogs with the disease — an important animal model for humans with muscular dystrophy.

Breakthroughs that rely on gene therapy are steadily increasing in number. Another one of Dr. Sleeper’s collaborators, Penn Vet’s Mark Haskins, VMD, PhD, has had excellent results replacing a malfunctioning enzyme in dogs with a devastating lysosomal storage disease. That treatment may soon enter clinical trials in children with the fatal condition.

Such promising results with gene therapy put Dr. Sleeper and other Penn Vet faculty at the cutting edge of medicine. “These kinds of approaches,” she said, “give us a whole different way of looking at disease.”

—BY KATHERINE UNGER BAILLIE



continued from page 5

the Holter monitor — a combination that resulted in a very specific and sensitive way to pre-screen dogs for disease. This two-faceted approach may offer owners a less pricey alternative to having vets perform an echocardiogram in addition to the Holter monitor to see if their dog requires further examination.

GENES FOR RISK

Another strategy for early diagnosis of DCM is to screen dogs for genes that predispose them to the condition.

“It seems realistic to think that there are breed-specific genetic abnormalities that predispose Doberman pinschers to get dilated cardiomyopathy,” said Dr. Oyama, “because the condition is so prevalent within the breed.”

But even though there are hundreds of genes that have been linked in humans with DCM, veterinary researchers have just begun to discover parallel genes in dogs.

The search for these mutations is made difficult because large populations are generally required to do genome-wide searches for abnormal genes. A breakthrough on the genetic front came earlier this year. Dr. Oyama was part of a team that reported on their discovery in a study led by Dr. Kathryn Meurs of North Carolina State University’s College of Veterinary Medicine.

Writing in the journal *Human Genetics*, Dr. Meurs’ team screened 48 healthy Dobermans and 48 Dobermans with diagnosed DCM for gene mutations that appeared prevalent in the sick dogs. In their analysis, they found one mutation that stood out in the DCM dogs. This abnormality, affecting the gene PDK4, appears to alter the metabolism of the heart, shifting it from burning fat — the heart’s preferred fuel — to sugar.


“Ultimately, this change could result in an energy-starved state,” the authors write, leading to a weakening of the heart’s contraction.

It’s clear that this one mutation is not responsible for all cases of inherited DCM in Dobermans — 18 percent of the animals with the disease in the study did not have the mutation. This fact complicates the hope for a quick genetic screening test for mutations that predisposes a dog to the disease. Such a test would be especially valuable for breeders, who would be able to use the procedure to identify individual animals to keep out of their breeding pool.

A BRIGHTER FUTURE

Despite the cruel rapidity of DCM, a dog diagnosed with the disease today is better off than it would have been 10 years ago. Researchers including Dr. Oyama continue to seek therapies that will dramatically decelerate the disease’s progression. Meanwhile, other scientists, including Margaret M. Sleeper, VMD, associate professor at Penn Vet, are aiming for treatments using gene therapy (see sidebar).

“A long time ago there simply weren’t enough people who were interested in studying cardiac diseases in dogs,” said Dr. Oyama. “Now you have a critical mass of investigators, many of whom collaborate and can look at multiple aspects of the disease.”

Together, these veterinarian-scientists may soon render DCM an eminently treatable — and one day, curable — condition. 



PROTECTING PUBLIC HEALTH

THE ROLE OF PENN VET

*Expanding the idea of what a
veterinary school does to protect
human and animal health*

BY KELLY STRATTON

“The community as a whole
has a stake in environmental
protection, hygiene and
sanitation, clean air and
surface water, uncontaminated
food and drinking water,
safe roads and products and
control of infectious disease.

Lawrence O. Gostin, Public Health
Law: Power | Duty | Restraint

In a continuing series of answering the question “What does a veterinarian do?” we focus this issue on three researchers at Penn Vet who are examining big-picture issues with the aim to find solutions for both human kind and animal kind. While two of our faculty members featured are not trained as veterinarians, their work speaks to the role of the veterinary school – and illustrates how Penn Vet is uniquely positioned to address such public health issues.

RABIES: A MODEL VIRUS

Ronald N. Harty, PhD, associate professor of microbiology, takes rabies seriously. Very seriously.

It’s in his lab where he and his team work to better understand the virus, focusing on its individual proteins, with the ultimate goal of intercepting its budding activities.

While lab workers don’t work with the live virus – instead they use Vesicular Stomatitis Virus (VSV) – this pathogen’s proteins act similarly to those of rabies virus.

Researchers in Dr. Harty’s lab are most interested in the molecular events that lead to virus assembly and budding and focus on the viral matrix proteins (M proteins) that serve as the building blocks of the virus particle. It’s those M proteins that work to orchestrate the function of assembly and budding and therefore spread of the virus within a body.

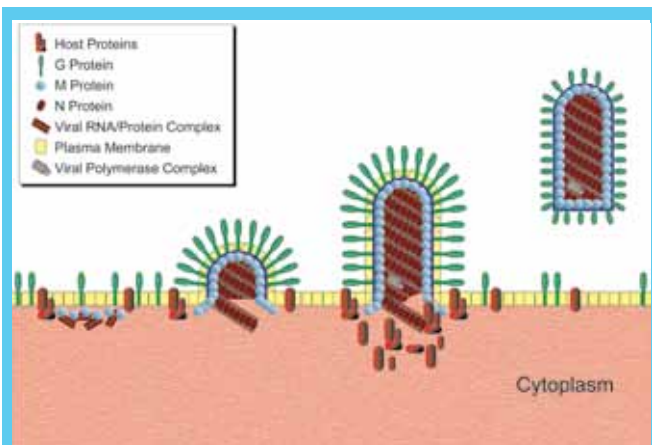


Diagram showing the sequential steps of rabies virus budding. The rabies virus M protein directs the early assembly process of viral RNA and associated proteins (N protein) at sites on the inner surface of the plasma membrane that are enriched for the G surface protein. Packaging of the helical viral RNA/protein complex into the virus particles begins as does bud protrusion through the plasma membrane. Host proteins recruited by the viral M protein help to facilitate the final step of virus-cell separation or pinching-off from cell surface, leading to the release and dissemination of mature, infectious virions. (Figure designed and created by Deborah Argento).

In addition to studying the relationship between how these viral M proteins interact with host proteins to facilitate the budding process, Dr. Harty's lab is also interested in understanding the host's innate immune response to virus infection and identifying antivirals that can inhibit the spread of the virus.

"Host proteins are hijacked by the virus to help with budding," said Dr. Harty. "But if we find an inhibitor to prevent that interaction, we could prevent the virus from spreading. It's called 'host-directed therapeutics.'"

But his lab isn't focused on rabies for rabies' sake.

Dr. Harty and colleagues are using what they learn from the rabies virus to apply it to other viruses that assemble and



Dr. Harty at work in his lab.

bud similarly, like Ebola and Marburg and other hemorrhagic syndrome viruses.

"Ebola and rabies viruses, they bud similarly," said Dr. Harty. "So if you find the inhibitor to block one, you could block many others."

Those others include HIV, Marburg and arenaviruses, such as Lassa fever.

Some of these viruses are considered likely bioterrorism agents and are on the high priority list of the Center for Disease Control and National Institutes of Health. High priority agents pose a risk to national security because they can be easily disseminated or transmitted, have potential for major public health impact and could cause widespread panic.

If Dr. Harty's lab can understand the mechanism of virus budding, then candidate drugs can be identified and presented to slow down the assembly/budding process and give the immune system an opportunity to begin fighting the pathogen.

"Vet schools are on the front line in terms of identifying and combating pathogens," said Dr. Harty. "Many diseases are zoonotic in origin so if we can understand how a virus works we can more quickly act if and when it jumps to the human population."

SOLVING THE MRSA MYSTERY

Methicillin-resistant *Staphylococcus aureus* (MRSA) infections are caused by a strain of staph bacteria that does not respond well to the kinds of antibiotic drugs normally used to treat them. Because of that, they can be particularly challenging to the human doctors trying to treat a patient and frustrating and painful for the patient.

If left untreated, superficial MRSA infections (of the skin and soft tissues) can progress to cause potentially life-threatening infections in a person's bones, joints, bloodstream and lungs.

So, when a MRSA scare strikes, public health experts and human physicians are called in to contain hysteria. People are told to wash their hands well and often, keep wounds covered, shower after working out and keep sheets on their beds clean.

But in some cases, the cycle – and the infection – continues, leaving patients and doctors confused and concerned.



Dr. Morris evaluating a patient at Ryan Hospital.

And it's when he hears about cases like these that Daniel O. Morris, DVM, MPH, section chief of dermatology and allergy at Ryan Hospital and professor of dermatology, brings a different point of view to the table.

"When a person has contracted a drug-resistant staph infection, you have to look at the entire household," said Dr. Morris. "You have to ask the human patient, 'Do you have any pets?'"

Pets are, according to Dr. Morris, a potential link in the cycle of infections within a household. Although pets typically carry a different species of Staph bacteria than do people, they are still capable of becoming silent carriers of the MRSA bacteria, just like their human counterparts. They can also develop MRSA infections, but their role in passing infections back to people is poorly characterized at the present time.

It's that potential link – of pets passing infections back to people – that Dr. Morris, in conjunction with the Perelman School of Medicine and Johns Hopkins, is looking at in a recently launched study. In it, Dr. Morris and his human medicine colleagues are specifically examining the prevalence of MRSA bacteria on pets and their bedding in households where a family member has a recurring MRSA infection. The study will also assess the persistence of Staph carriage by the pet, when the household and family members undergo a treatment intervention. It's an important step in understanding the relationships between people and their pets and the appropriateness of how close we should allow our best friends to be.

In the case of a recurring infection, is the person living with a pet? And is the pet sleeping in the bed? Giving kisses? Is the pet a dog that serves in a therapy capacity and goes on hospital visits, where the likelihood of contracting MRSA is greater? If so, and the pet is a "silent carrier," the recurring infection of a household member could potentially be related to close pet contact, and this relationship will need to be adjusted to put an end to the cycle.

But just the simple question of "Do you own a dog?" isn't often in a medical doctor's repertoire.

"Veterinarians need to be involved when a physician suggests a pet-to-person link," said Dr. Morris. "It's what they do. They're trained to ask different questions and they understand the human-animal bond a little better than a medical doctor might. The pet is the member of the family – they're sleeping in the same bed, licking people's faces. It's what's in the journals we read and it's what we talk about as part of our daily practice."

DEFINING DISEASE BIOMARKERS

Cutaneous leishmaniasis is an ugly disease. A protozoan parasite transmitted by sand flies, *leishmaniasis* may not sound familiar to many in the U.S., but for the people of Brazil

and across the Middle East and Afghanistan, the disease is much more prevalent. In Corte de Pedra, Brazil there are approximately 1,000 new cases annually.

And it is there that Phillip Scott, PhD, associate dean for research, professor of microbiology and immunology, focuses his research.

There are two types of the parasite – cutaneous and visceral. Dr. Scott's lab focuses on the cutaneous disease, which causes skin lesions, hair loss and dermatitis. The parasite affects people, as well as dogs.

"It's similar to leprosy," said Dr. Scott.

(The visceral type leads to swollen lymph nodes, weight loss, decreased appetite, nose bleeds and, eventually, kidney failure.)

What is interesting about the cutaneous disease is that some individuals have a severe reaction to infection while others have more mild reactions.

In his laboratory, Dr. Scott and his colleagues are working to define biomarkers to understand this discrepancy in reaction. Based on an individual's immune response, his lab may be able to successfully fight infection with the help of a drug, while others may need repeated treatments.

When early lesions are identified, an individual goes through a 21-day treatment of receiving the drug intravenously.

If however, within the first 15 days of infection, a biomarker is identified that shows a person will not respond to that treatment, the attending physician can jump straight to the second treatment option, which involves a stronger, more expensive drug.

"There's no vaccine, treatment isn't great," said Dr. Scott, "but if we can identify the biomarkers of those people who don't respond well with the traditional first round of treatment, we can go straight to the second option – a better, more expensive drug."

In a recent paper published in *The Journal of Immunology*, Dr. Scott and co-investigators point out a probable link between the relationship of T cell response and the likelihood of the cutaneous lesions returning. That is, the inability of lymph nodes to recruit lymphocytes may mean a greater likelihood of a chronic, recurring condition in certain individuals.

"Understanding how these parasites circumvent generating a strong immune response allows us to design new therapies to enhance immune responses in patients, and thus promote more rapid cure of the disease," said Dr. Scott. ■



Phillip Scott, PhD

Veterinary Medicine: Leading Social Change



PennVet



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PennVet

2012 STUDENT INSPIRATION awards

BY SALLY SILVERMAN

FOR THE FIFTH CONSECUTIVE YEAR, PENN VET HAS NAMED THE RECIPIENTS OF ITS STUDENT INSPIRATION AWARDS.

EACH YEAR, STUDENTS WITH BIG IDEAS AND A PASSION TO SHARE THEIR KNOWLEDGE ARE HONORED WITH THE AWARDS, WHICH ARE GRANTED TO HELP THEM ACHIEVE THEIR GOALS.

THIS YEAR, TWO PROJECTS HAVE BEEN CHOSEN TO RECEIVE THE AWARD. BOTH PROJECTS ARE FOCUSED ON IMPROVING THE NUTRITION AND LIVELIHOODS OF VILLAGES IN HAITI AND INDIA THROUGH FOCUSING ON ANIMAL HEALTH AND ECONOMIC SUSTAINABILITY.

Lending Haiti a Helping Hand

To A. Nikki Wright and Lisa Gretebeck, the impoverished Caribbean nation of Haiti means opportunity. In a country where 80 percent of the population lives below the poverty line, Wright and Gretebeck have identified a unique opportunity to both better economic conditions while improving human nutritional health and standards. Their proposed project is a learning center in Haiti that will provide education and training in sustainable goat management, while improving the genetics of the local goat population and supporting financial independence and community commerce.

With experience in small animal veterinary practice, lab animal medicine and biomedical research, Wright entered vet school with an appreciation for the interconnected nature of human, animal and environmental health.

“Since starting veterinary school,” she said, “I have discovered that my desire to further the concept of One Health is best served via my passion for food animal medicine, and in particular the fields of infectious disease, epidemiology, and food security.”

After visiting Haiti, and witnessing the devastation that grips the country, she became determined to find a way to contribute sustainable solutions to the problems of its people.

During her undergraduate career at Middlebury College, Gretebeck participated in a public and primary health care course with the Comprehensive Rural Health Project in India. It was here that she first became aware of the innovative possibilities for a multi-disciplinary approach to promoting community health. She returned to India a year later to develop a micro-finance-based goat production project, which proved to be a powerful tool for the community. The women named the project AMAR, meaning “never



Working in Haiti, Lisa Gretebeck (pictured in two left images) and Nikki Wright (pictured in two right images) aim to improve nutritional health of people through bettering the genetics of the local goat population.

ending” in their local language, and it is a name that Wright and Gretebeck have chosen for their Haiti project.

“This experience in India,” said Gretebeck, “and understanding the impact that animals can have on people, were crucial factors in my pursuing a veterinary degree.”

When the two veterinarians-in-training became aware of their shared interest, they began to work together. They have already made tremendous progress with their project, establishing partnerships with the iF Foundation, a nonprofit offering micro-financing for disadvantaged populations in developing countries, and Dr. Keith Flanagan, an American veterinarian who has been in Haiti for more than 25 years. The iF Foundation donated a small piece of land where Wright and Gretebeck will build a hurricane-resistant house for 20 goats. They have already begun to farm the local forage that will provide feed for the goats. An existing building on the property will be modified to serve as a classroom, clinical lab, storage facility and living area for farm staff and interns.

Five families at a time will participate in a training internship that will focus on basic goat husbandry as well as reproductive principles, parasite management and nutrition. Successful completion of the internship will earn each family a bred female goat and weanling kid. The families will also agree to donate a goat back to the center in the future, in an effort to maintain the population.

The goal of AMAR Haiti is self-sustainability; it’s a program in which the roles of both Wright and Gretebeck will eventually become obsolete.

Said Gretebeck, “I told the women of AMAR [in India] that I was going to study to become a veterinarian, and come up with the most effective and sustainable goat project possible. I am keeping my promise.”

The AMAR project, evaluated with bi-annual progress reports based on qualitative interviews, will become the model for a successful and sustainable program that can be applied to different communities throughout the world.

Educating Women, Improving Processes in India

According to a quote from the World Bank, “GDP growth originating in agriculture is at least twice as effective in reducing poverty than GDP growth originating in other

sectors.” With that key factor, the Student Inspiration project of Audrey Barker and Shannon Kerrigan will focus on educating women in the Nellore District of Andhra Pradesh, India on more efficient dairy husbandry practices. The yearly hands-on training they conduct will be supported by monthly educational sessions via an internet interface and a website composed of pictorials and audiovisual learning aids.

Kerrigan first visited India as an undergraduate at Rutgers University, participating in Semester at Sea. Barker first traveled to India as a study-abroad student while an undergraduate at University of Maryland. Their shared interest in India and the desire to use the power of veterinary medicine to improve the conditions of those in need brought them together at Penn Vet.

Traveling to India in the summer of 2011, the two were involved in a study on the prevalence of internal parasites in dogs and cats. It was while journeying through the Indian countryside that, observing the reliance of the population on livestock for nutrition and financial security, and the poor management and healthcare of that livestock, they began to focus on the potential for veterinary medicine to have a positive impact on rural communities. Their next step was a trip to more than 15 Indian villages conducting surveys on animal husbandry and production. They met with government officials and veterinarians, dairy self-help groups and government agencies. Their experiences and the data collected focused them on dairy animal production in the rural communities of Andhra Pradesh.

Their project, Penn Vet Mere Saathi, is the vehicle by which Barker and Kerrigan hope to realize their vision to improve the socio-economic conditions of the poorest of individuals through improved productivity of dairy stock. Their educational approach will focus on five topics: the importance of regular veterinary care and its impact on milk production; utilizing the free and subsidized government veterinary care and rural development programs; recognizing common health problems; proper heat detection and other breeding practices; and nutrition management. Barker and Kerrigan have already established rapport in several villages with the leaders of government-sponsored Self Help Groups through which Penn Vet Mere Saathi will function.

Said Dr. Y. Ramana Reddy of the Sri Venkateswara Veterinary University, “The project set forth by these women will strengthen Indian dairy farmers, students and people in dairy industry by improving milk quality at farm and manufacturing levels as well as the marketing level.”



In India, Audrey Barker and Shannon Kerrigan aim to educate women on efficient dairy husbandry practices with an online and in-person training program they are working to create.

2016

CLASS OF
2016 BY THE
NUMBERS

33

NUMBER OF UNDERGRADUATE
AREAS OF CONCENTRATION

NUMBER
OF LEGACY
STUDENTS

4

4

TOTAL NUMBER
OF PENNSYLVANIA
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NUMBER OF STUDENTS
IN THE CLASS OF '16

125



10

NUMBER WHO
PARTICIPATED
IN SUMMER
VETS PROGRAM

Road to Recovery with Rehabilitation Medicine

BY SALLY SILVERMAN

When little Chloe King arrived at the Ryan Hospital emergency services very late one Sunday night last November, the prognosis was not good. The five-year-old Dachshund had tumbled down the stairs four days earlier, and though she was able to walk immediately after the fall, had become progressively weaker and, eventually, had lost her ability to walk at all.

In the early morning of November 20, Chloe underwent a hemilaminectomy performed by Annie Lo, DVM to remove pressure on her spine.

Fast forward to August, and Chloe is walking on her own, seemingly pain-free. The long scar along her back is covered with her tawny fur and, except for a rear paw slipping out from under her occasionally when she gets excited, it's hard to believe that she was once unable to walk at all.

The road was a long, grueling journey of continuous rehabilitative care. Within 24 hours after surgery, Ann Caulfield, VMD was visiting Chloe. Dr. Caulfield is the clinician in the Rehabilitation Medicine Service at Ryan Hospital, which was launched in 2011. In addition to her veterinary degree, Dr. Caulfield has received advanced training and certification in veterinary rehab therapy at the University of Tennessee's Veterinary College and completed the International Veterinary Acupuncture Society's (IVAS) training program in both canine and equine acupuncture. She has years of clinical experience in rehabilitation medicine.



Following surgery, Chloe was still paralyzed in both hind legs. When Dr. Caulfield lightly pinched the dog's toes, looking for a response, she did not pull back, turn to look at her feet or even appear agitated.

"What I saw was not good," said Dr. Caulfield. "She had no deep pain response or voluntary motor response."



Despite that, Dr. Caulfield felt that Chloe was a good candidate for early intervention rehabilitation therapy, and started right away with a variety of things appropriate for a dog so recently out of surgery.

"We started with assisted standing exercises," said Dr. Caulfield.

Chloe was rolled onto a bolster that supported her belly, while pressure was applied to one hip, then the other, shifting her weight back and forth and front to back.

"This exercise challenges the dog's balance and encourages strengthening. It's also mentally important for the animal to be in that upright position."

Chloe, she said, was like a limp noodle hanging over the bolster. Still, Dr. Caulfield, assisted by nursing staff and students, repeated the exercise four to six times daily for a minute or two.

Massage was another aspect of the therapy.

"We did a lot of soft tissue massage on Chloe's upper body. With the hind end not working, it's common to see abnormal upper body compensatory movement disorders such as stress and strain on the shoulder and trunk muscles because they are being overused. From a neuro-stimulatory standpoint," said Dr. Caulfield, "massaging the feet and legs also helps to stimulate the sensory nervous system."

And massage has a bonus, too. It feels good, reduces stress and stress hormones, which can be impediments to healing.

"By incorporating massage into every session with Chloe, it was helpful to her not only physically, but mentally as well."

Finally, Dr. Caulfield facilitated normal movement patterns one back leg at a time through the natural movements of walking.



Dennis, Chloe and Carol, nine months after Chloe's surgery.

TRANSITIONING TO CONTINUED CARE AT HOME

After three days at Ryan, it was time for Chloe to go home. Dr. Caulfield joined Dr. Lo at the discharge appointment with Chloe's owners Dennis and Carol King. Chloe couldn't stand, was in pain and had a large, stapled incision down her spine. Dr. Caulfield worked on Chloe in her characteristic calm manner.

"I explained to the Kings the exercises that they would have to continue with Chloe, and why they were important," said Dr. Caulfield.

She demonstrated each of the exercises three or four times, inviting the Kings to put their hands over hers to mimic the movements and amount of pressure she was using.

"They were pretty overwhelmed," said Dr. Caulfield. "It's not unusual at this point for people to also worry if they have made the right decision or not."

"It was a lot," said Dennis King. "But when we took her in for the surgery, we did it with the knowledge that we would see it through. We would go all the way."

Committed to seeing that Chloe got every chance she could, the Kings took up residence on their first floor, moving some mattresses onto the living room, and covering a small dining table to use as a treatment center. And they followed as faithfully as possible the instructions given to them by Dr. Caulfield.

At the first follow-up visit, two weeks after the discharge, the little dog could maintain a standing position without help. Dr. Caulfield told the Kings to remove the bolster support, and come back to see her every two weeks.

MAKING PROGRESS

Within a month there was increased tone in the hind legs and, though she could still not get up on her own, Chloe was able to stand for a longer period of time. Dr. Caulfield formalized her walking program with a minute of sling-supported walking three times daily. At this point standing exercises were made more challenging by prescribing that the front legs be elevated to put more weight on the back end. It was clear that Chloe was getting some sensation in her feet and beginning voluntary motor movement.

"Throughout this process, we were challenging Chloe with what was appropriate for her stage of recovery," said Dr. Caulfield. "We were gradually increasing hold times and the number of repetitions until she was ready to move to the next level."

By January, Chloe needed less support with the sling and was able to walk over poles on the ground to improve her balance.

Chloe's progress continued to improve and today she is walking in balance, with no assistance.

In addition to enhancing the dog's recovery, Dr. Caulfield sees the rehabilitation team as a sort of cheerleader for pet owners who might be frustrated.

"People want to be involved in a meaningful way, to help their pets recover as quickly and as comfortably as possible," said Dr. Caulfield. "We give them that option. And when they start to assess how they are doing, and see the little changes, that's really meaningful for them."

Protocols used to indicate that a post-surgical case like Chloe be confined to a crate for six weeks before beginning any rehabilitative therapy.

"Now," said Dr. Caulfield, "we know that we are better able to address all of a dog's needs with appropriate intervention, starting from day one."

In addition to improving surgical outcomes through controlled exercise, Dr. Caulfield also works with a variety of species to increase joint flexibility and muscle mass and improve mobility. Pain management and weight management are two of the areas that will receive focus in the future.

Dennis King recalls the first moment that he saw a response from Chloe when he touched her foot and how incredible the feeling was. He couldn't wait to share the news with Dr. Caulfield, who he said was so generous with her time, calling to check on Chloe between their biweekly visits.

"I can't say enough good things," he said. "I will give you four words: competent, caring, compassionate and encouraging." 🍷

9.11.12

PENN VET WORKING DOG CENTER



ON TUESDAY, SEPT. 11, PENN VET OPENED THE PENN VET WORKING DOG CENTER. FOUNDED AND DIRECTED BY CYNTHIA M. OTTO, DVM, PHD, THE CENTER AIMS TO BREED, RAISE AND TRAIN DETECTION DOGS WHILE FOCUSING ON THE OVERALL HEALTH AND WELL BEING OF THESE KINDS OF DOGS.



Photos by John Donges, Penn Vet,
and Steven Minicola, University of
Pennsylvania Communications





events

This summer was busy at Penn Vet. From top right of page 20: Student club VOICE (Veterinary Students as One in Culture and Ethnicity) hosted an open house for West Philadelphia students this summer, providing the opportunity to see first-hand what the world of veterinary medicine offers as a career possibility. Current Penn Vet students hosted the younger student groups to show them a day in the life of Ryan Hospital, which included X-ray examinations and the opportunity to check in on a patient of Dr. David Holt's. Similarly, the Penn Vet Admissions team once again hosted the Summer VETS (Veterinary Exploration Through Science) program, which hosts high school- and college-aged students for week-long day camps. Here, Dr. Shelley Rankin and Michelle Traverse explain what students are seeing under the microscope, and Adelaide Paul gives the students a tour of the anatomy lab. In August, the University of Pennsylvania and Penn Vet sponsored the Penn Symposium in honor of Ralph L. Brinster, VMD, PhD, Richard King Mellon Professor of Reproductive Physiology at Penn Vet, and the more than five decades he has dedicated to research on the manipulation of the mammalian germline. Often regarded as the father of transgenesis, Dr. Brinster was the first veterinarian to receive the prestigious National Medal of Science. The Symposium welcomed more than 15 scientists from around the world as speakers.



events



special gifts to the school

Without the support of steadfast friends, Penn Vet would not be able to fulfill its mission of education, research and service. I am deeply thankful for those we can count on year after year for your continued investment in all we do at Penn Vet for the betterment of the community.

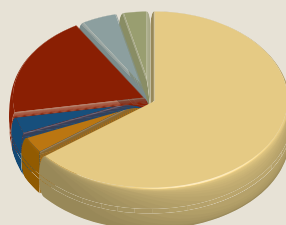
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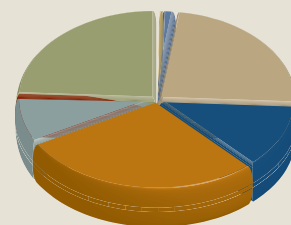
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\$16,606,090 Bequests

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Penn Vet consistently strives to expand research dollars because it allows faculty and staff to find new methods of treating devastating diseases and illnesses which afflict both animals and humans. Additional resources will enable Penn Vet to play a leading role in introducing novel strategies and treatments, such as stem cell therapies, in animals long before they can be applied to humans.

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Allaying the national shortage of veterinarians poses a special challenge at Penn, where, as a private institution, tuition is relatively high. Graduates now leave the School of Veterinary Medicine with an average debt of \$160,000. Relieving the burden will allow students to pursue post-doctoral studies and careers in fields where there are critical shortages. Scholarship support also allows Penn Vet to recruit the best and brightest students.

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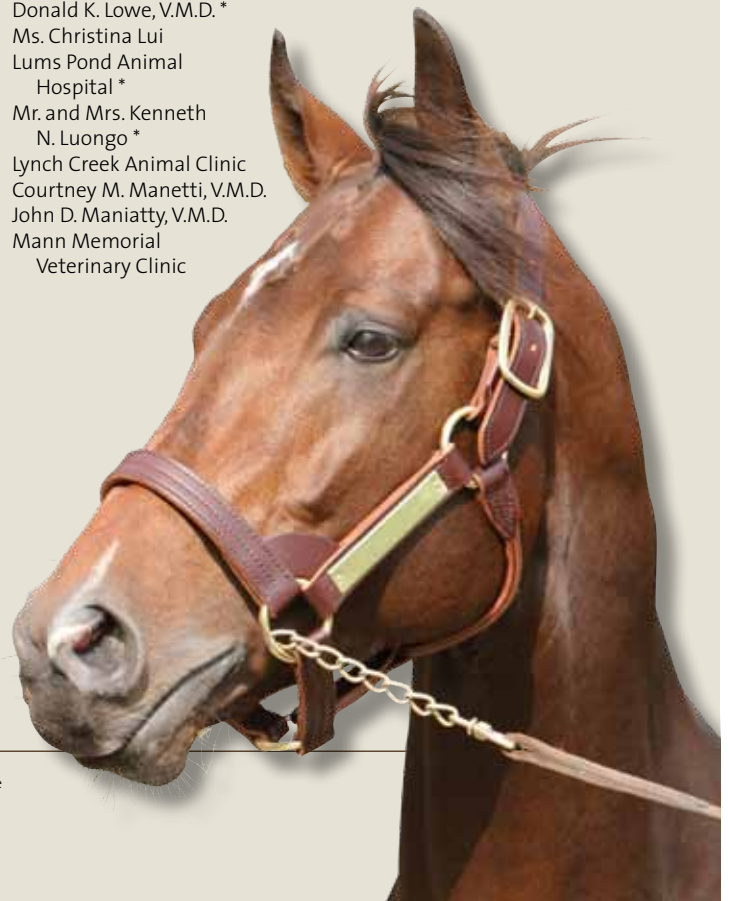
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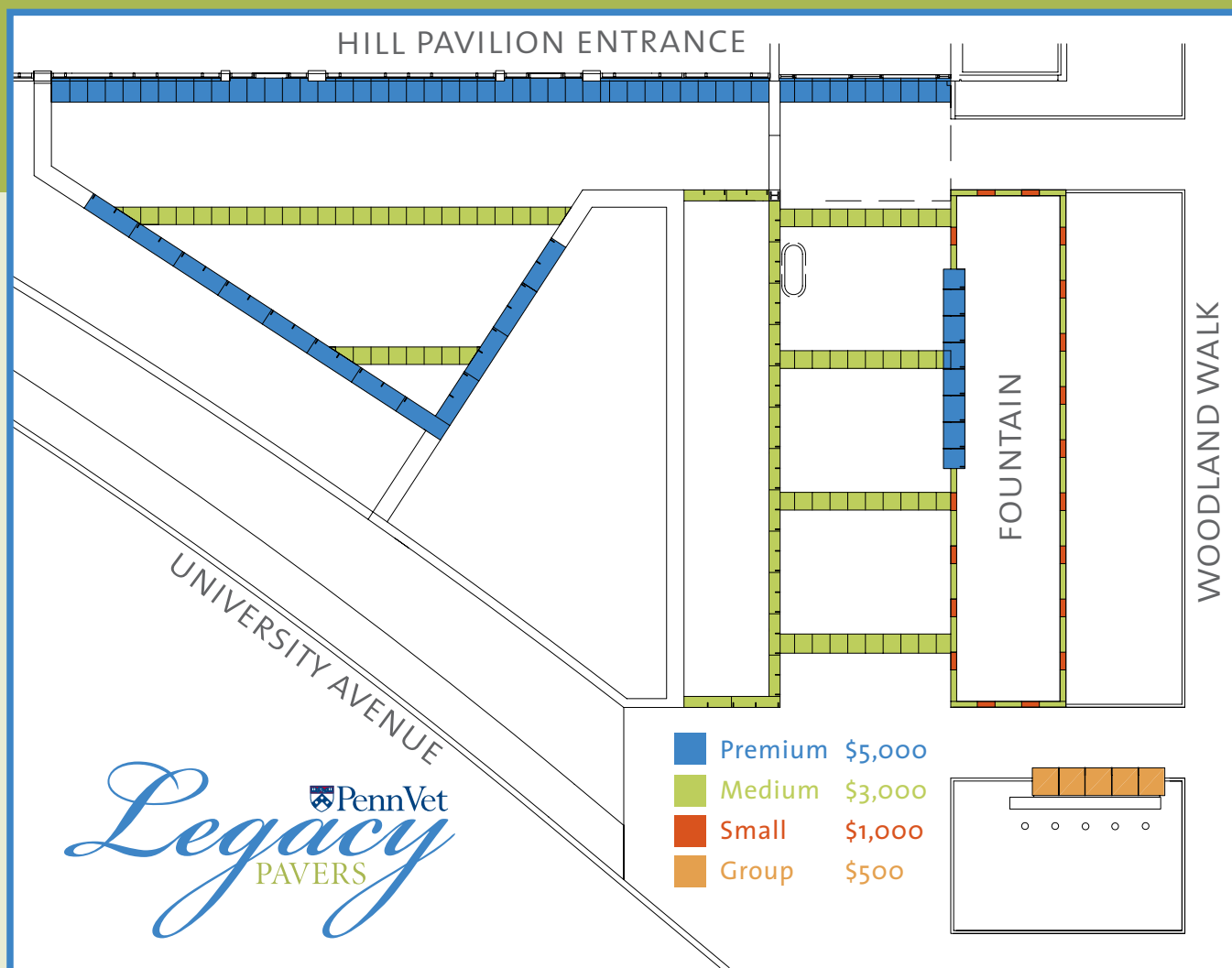
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You – our dedicated alumni, students, parents, clients and friends – have a special affinity for Penn Vet. And it is because of that relationship that we are inviting you to become a part of our history as we dedicate a new outdoor space where your Penn Vet experience can be forever remembered. This fall, we are offering the opportunity to have granite pavers engraved with the names of those whose lives have been touched by the school in the Hill Pavilion Plaza on the Philadelphia campus.

This is a unique chance for you to memorialize a beloved pet, honor a veterinarian that provided exceptional care, celebrate a reunion class – and more. You may also choose

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Share your own story by reserving a paver today and creating a permanent legacy in support of Penn Vet and the School's mission of teaching, research and service. Pledges must be made by **December 31, 2012** to be included in the *Making History* campaign. Plans are currently underway to identify an additional location on the New Bolton Center campus in 2013; for more information, please contact Jillian Marcussen, director of special projects, at 215-898-4235 and jillian2@vet.upenn.edu, or visit <http://www.vet.upenn.edu/paverprogram>.



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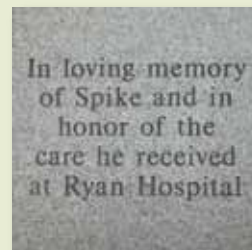


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Please contact Jillian Marcussen at 215.898.4235 or jillian2@vet.upenn.edu.

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Dr. Ted Hill (V'74)

BY JANE SIMONE

Dr. Ted Hill (V'74) has spent his entire life immersed in the horse world. From growing up with a father who was deeply involved with Standardbreds and Quarter Horses, to his junior high years, when he showed horses in Delaware, to his veterinary education at Penn and years as a private equine practitioner, race track veterinarian and ultimately, Jockey Club Steward, horses have been Ted's life from early childhood.

Ted recalls spending a lot of time observing veterinarians working on his family's horses and the horses his father trained. Over time, Ted says, he thought it would be a very interesting profession to pursue. As a Delaware resident, Penn was the logical school for him.

"I applied to a couple of other schools, and was granted interviews, but was accepted at Penn – the decision was easy," said Ted.

Ted has fond memories of his Penn Vet education, characterizing those four years as the "most memorable and enjoyable" of his life.

"I was exposed to such great teaching staff! I'm sure today's students will say the same thing, but to have studied under people like Charlie Raker, Loren Evans, R.O. Davies and so many others – all of whom clearly wanted their students to succeed. They were stern and challenging, but always there for you."

Ted spent the best part of his third and fourth years at New Bolton Center and describes it as "such a great time!" He recalls that New Bolton Center was especially busy during those years and fondly recounted the weekly visits to Dr. and Mrs. Boucher's house, where Mrs. Boucher would serve milk and cookies and the students would relax in a family atmosphere.

Rounds early on Saturday morning were held in the old cattle barn and Dr. Boucher would stand with the students and other faculty and engage in extensive debates.

"We would all expound our theories about everything," said Ted, "and then Dr. Boucher would step in and say, 'That's all very well – but we'll find out more on the post-mortem floor!' He had such great common sense and after all our high-flying interpretations he would bring us firmly back to earth. These are wonderful memories and I formed so many great friendships during those years, many of which endure to this day."

After graduating, Ted went into private equine practice in Miami, Fla. It was a large practice and he remembers it as a great experience during which he was able to work with outstanding people. He is still in touch with them. His next professional move was to go into private practice with Dr. Jim Hill, then part-owner of the great *Seattle Slew*. This meant a move to New York.

During that time he was approached by Dr. Manual Alan Gilman (V'45) to work as an official track veterinarian. Dr. Gilman spent 32 years as chief examining veterinarian at New York racetracks and later served as Jockey Club Steward at Aqueduct, Belmont and Saratoga racetracks. Ted enjoyed private practice and wasn't sure about going to work at the track as an official. Ultimately, he



“

I was exposed to such great teaching staff! I'm sure today's students will say the same thing, but to have studied under people like Charlie Raker, Loren Evans, R.O. Davies and so many others – all of whom clearly wanted their students to succeed. They were stern and challenging, but always there for you.

– Dr. Ted Hill, V'74

committed to giving Dr. Gilman a year, which became a 20-year career.

It was Ogden Mills “Dinny” Phipps who approached Ted about becoming a Jockey Club Steward. Ted recalls that it represented a drastic change from what he was doing and loved and he was unsure about pursuing it.

“The deciding factor for me was that Mr. Phipps wanted me to remain very active in the veterinary profession – not just being a race day steward, but staying active in my work, the AAEP and all the veterinary issues that arise at the race track,” said Ted.

Ted speaks highly of the values and standards expected by Mr. Phipps.


“There are no compromises. The principles by which he operates are very straightforward – do the right thing, be fair with everyone regardless of rank or position and always take the high road. My father worked by those principles – it is easy to work for someone when you know there are no gray areas.”

Some of the difficulties of being a track veterinarian or Jockey Club Steward are the conflicting opinions of many people.

“As a veterinarian or steward I make decisions and stand by them,” said Ted. “You may seek advice from other professionals but when you are there protecting the horse, and laymen challenge your position, I always return to the fact that the horse’s welfare is my top priority. You are there to protect the horse, and that necessarily means you are protecting the owner, the trainer, the race-going public, whether they understand that or not.”

Ted is very proud of his affiliation with the International Conference of Racing Analysts and Veterinarians (ICRAV). This unique conference takes place every two years and has just concluded in Philadelphia. For the past six years, Ted has chaired the veterinary group of this conference in places as diverse as New Zealand and Turkey. It is, he says, a one-of-a-kind meeting at which there is probably more relevant analytical and regulatory information shared than at any other professional gathering – a very special, valuable and worthwhile enterprise.

This year he steps down as Chairman, but cheerfully observed that in 2014 the conference will be held in Mauritius, which will allow him to indulge in another of his passions – scuba-diving.

When he is not calling major races at Saratoga and elsewhere, he and his wife Caroline love to scuba-dive, boat and play with their two standard poodles on the Florida or Delaware beaches, where Ted still has his boyhood home to return to. For this busy and influential Penn Vet graduate, there is no sign of a slow-down. The veterinary profession is fortunate indeed to have a person of Dr. Hill’s experience and caliber in its midst. 

2012-13 LECTURE SERIES

New Bolton Center

Woerner Amphitheatre from 6:30-7:30 PM

Though the lectures are free, seating is limited. To reserve a seat, please RSVP to **610-925-6500** or email **Barbara Belt at beltb@vet.upenn.edu**. Please check our website for updates to the lecture schedule later in the year.

November 6, 2012, 6:30-7:30 PM

Headshaking Syndrome in Horses

*Dr. Louise Southwood, DVM, MS, PhD
Emergency & Critical Care*

December 4, 2012, 6:30-7:30 PM

The Critically Ill Foal

Jonathan Palmer, V.M.D., DACVIM, Medicine

January 8, 2013, 6:30-7:30 PM

Easy Keepers – Metabolic Disease in Horses

Santiago Garcia, MVZ

February 5, 2013, 6:30-7:30 PM

Eye Cancer in Horses: What Does It Look Like and What You Can Do About It?

Mary Utter, DVM, DACVO, Ophthalmology

Ryan Hospital

For more detailed information about each lecture and to make a reservation to attend, please visit our website at www.vet.upenn.edu/AnimalLoversLecture or call 215-898-1480.

November 10, 2012, 10:00-11:30 AM

Basic First Aid for Your Pet

*Dana Clarke, DVM, DACVIM,
Lecturer, Interventional Radiology and Critical Care
Dog Training Club of Chester Co., Exton, PA*

December 8, 2012, 10:00-11:30 AM

Caring for Your Aging Pet

*Ann Caulfield, V.M.D., Clinician, Rehabilitation Medicine
Penn Med at Radnor, Radnor PA*

January 12, 2013, 10:00-11:30 AM

Caring for Your Furry, Feathered or Scaled Pet

*Nicole Wyre, DVM, Chief of Service,
Exotic Companion Animal Medicine and Surgery
La'Toya Latney, DVM, Lecturer,
Exotic Companion Animal Medicine and Surgery
Hill Pavilion, Philadelphia, PA*

February 9, 2013, 10:00-11:30 AM

Creating a Non-Toxic Environment for Your Pets

*Lisa Murphy, V.M.D.,
Assistant Professor of Toxicology
TriState Bird Rescue, Newark DE*

T Cells ‘Hunt’ Parasites Like Animal Predators Seek Prey, a Penn Vet-Penn Physics Study Reveals

BY KATHERINE UNGER BAILLIE

By pairing an intimate knowledge of immune-system function with a deep understanding of statistical physics, a cross-disciplinary team at the University of Pennsylvania has arrived at a surprising finding: T cells use a movement strategy to track down parasites that is similar to strategies that predators such as monkeys, sharks and blue-fin tuna use to hunt their prey.

With this new insight into immune-cell movement patterns, scientists will be able to create more accurate models of immune-system function, which may, in turn, inform novel approaches to combat diseases from cancer to HIV/AIDS to arthritis.

The research involved a unique collaboration between the laboratories of senior authors Christopher Hunter, professor and chair of the Pathobiology Department at Penn Vet, and Andrea Liu, the Hepburn Professor of Physics in the Department of Physics and Astronomy. Penn Vet postdoctoral researcher Tajie Harris and physics graduate student Edward Banigan also played leading roles in the research.

The study, published recently in *Nature*, was conducted in mice infected with the parasite *Toxoplasma gondii*. This single-celled pathogen is a common cause of infection in humans and animals; as much as a third of the world's population has a dormant form of this infection present in the brain. However, in immunocompromised individuals, such as those with HIV/AIDS or undergoing organ transplantation, this infection can have serious consequences, including brain inflammation and even death.

Earlier work had shown that T cells — a key immune-cell type — are central in preventing disease caused by *T. gondii*. In the new study, the Penn researchers used the infected mice as a natural model system to learn how the movement of T cells in the brain affects the body's ability to control this infection.

Among immunologists, it's widely believed that the movement of immune cells is governed in part by signaling proteins called chemokines. The Penn-led team demonstrated that a specific chemokine, CXCL10, and its receptor were abundantly produced in the brains of *T. gondii*-infected mice. When CXCL10 was blocked, mice had fewer T cells, a greater parasite burden and actively reproducing parasites.

Next the researchers sought to pinpoint the exact movement patterns of individual T cells in living tissue from *T. gondii*-infected mice. This was possible with multi-photon imaging, a technique that relies on a refined yet powerful microscope that can display living tissues in three dimensions in real time. Using this approach, the team found that CXCL10 appeared to play a role in the speed at which T cells are able to search for and control infection.

To the extent that immunologists had considered T-cell movement patterns at all, many assumed that they moved in a highly directed fashion to find infected cells. But when the researchers analyzed the movement of T cells, they found their data did not match what would be expected: the T cells showed no directed motion.

That's where the statistical physics expertise of Dr. Liu and Banigan came in.

"We looked at a much more complete way to quantify these tracks and found that the standard model didn't fit at all," Dr. Liu said. "After some work we managed to find a model that did fit the tracks beautifully."

"The model that finally led us down the right path," Banigan said, "had a strong signature of something really interesting," a model known as a Lévy walk.

This "walk," or a mathematically characterized path, tends to have many short "steps" and occasional long "runs." The model was not fully consistent with the data, however.

"Rather, I had to look at variations on the Lévy walk model," Banigan said, because the researchers also observed that the T cells paused between steps and runs. Like the movements of the cells, the pauses were usually short but occasionally long.

Dr. Hunter likened the model to a strategy a person might employ to find misplaced keys in the house.

"When you lose your keys, how do you go about looking for them? You look in one place for a while, then move to another place and look there," he said.

"What that leads to is a much more efficient way of finding things," Dr. Liu said.

And, indeed, when the team modeled the generalized Lévy strategy against other strategies, they confirmed that the Lévy walk was a more efficient technique to find rare targets. That makes sense for T cells, which have to locate sparsely distributed parasites in a sea of mostly normal tissue.

Interestingly, T cells are not alone in employing a Lévy-type strategy to find their targets. Several animal predators move in a similar way — with many short-distance movements interspersed with occasional longer-distance moves — to find their prey. The strategy seems particularly common among marine predators, including tuna, sharks, zooplankton, sea turtles and penguins, though terrestrial species like spider monkeys and honeybees may use the same approach to locate rare resources.

This parallel with animal predators also makes sense because parasites, like prey species, have evolved to evade detection.

"Many pathogens know how to hide, so T cells are not able to move directly to their target," Dr. Hunter said. "The T cell actually needs to go into an area and then see if there's anything there."

The model is also relevant to cancer and other immune-mediated diseases, Dr. Hunter noted.

"Instead of looking for a parasite, these T cells could be looking for a cancer cell," he said. By knowing what

controls T cell movement, "you might be able to devise strategies to make the T cells more efficient at finding those cells."

On the physics side, while the Lévy-walk model is not new, the fact that T cells pause in between their steps or runs is something that hadn't been recognized before when mapping the paths in other contexts.


"From a physics point of view, to have runs and pauses is a new model," Dr. Liu said. "Biological phenomena can illustrate what we wouldn't have thought about otherwise."

The Penn collaborators are working to plot the tracks of other cell types and credit their unique partnership for their discovery.

"We've said all along that this study could only happen because [our physics colleagues] had such a great expertise and we had our own separate expertise," Dr. Harris said. "They took a chance working with us, and it turned out to be something really rewarding."

Additional Penn contributors to this study included Penn Vet's David Christian, Christoph Konradt, Elia Tait Wojno and Beena John.

The Penn team partnered on the work with Kazumi Norose of Chiba University in Japan; Emma Wilson of the University of California, Riverside; Wolfgang Weninger of the Sydney Medical School; and Andrew Luster of Massachusetts General Hospital.

The study was supported by the University of Pennsylvania, National Institutes of Health, National Science Foundation, Commonwealth of Pennsylvania, Japan Society for the Promotion of Science and Ministry of Education, Culture, Sports, Science and Technology of Japan. 

RECENT PUBLICATIONS

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GRANTS

David Artis, PhD, associate professor of parasitology, has received a five-year grant to study cytokine regulation of anti-helminth immunity totaling \$2 million.

Christopher A. Hunter, BSc, PhD, professor and chairman of the department of pathobiology, received a grant from the American Asthma Foundation totaling \$750,000 over three years. The Foundation funds three percent of applicants.

Gustavo Aguirre, VMD, PhD, professor of medical genetics and ophthalmology, has received a three-year, \$300,000 grant from the Macula Vision Research Foundation to study Gene Replacement Therapy in Bestrophin 1 Model: Implications for Recessive and Dominant Human BEST1-Disorders.

Mark Haskins, VMD, MS, PhD, professor of pathology, received a Penn pilot grant totaling \$149,831 and spanning two years to study the pathophysiology and the effect of treatments on cardiovascular disease in Mucopolysaccharidosis I in dogs. The goal of the grant is to test simvastatin in combination with enzyme therapy in dogs with MPS I.

In addition, **Dr. Haskins** received a second Penn pilot grant totaling \$164,686 and spanning two years to study the pre-clinical evaluation of TNF-antagonists for the treatment of MPS I in combination with enzyme replacement therapy. The goal of the grant is to test a cat-based anti-inflammatory drug in combination with enzyme therapy in cats with MPS I.

Regina Turner, VMD, PhD, associate professor of reproduction, received a two-year, \$109,732 grant from the Grayson Jockey Club to study understanding testicular degeneration.

Ron Harty (PI), PhD, associate professor of microbiology, and Bruce Freedman (Co-PI), MS, VMD, PhD, associate professor received a \$275,000 grant from the NIH to study host-oriented therapeutics targeting filovirus budding. The grant will span two years.

Tracy Bale, PhD, associate professor of neuroscience, received a \$3.75 million NIH/NIMH grant to study prepubertal stress: windows of risk and sex bias for affective disturbance P50 SCOR. The grant will span five years.



AGUIRRE

Gustavo Aguirre, VMD, PhD spoke on May 30, 2012 at the Centre for Brain Repair, Addenbrooke's Hospital, Cambridge University, UK. His lecture was on "Photoreceptor directed gene therapy restoring function and structure, and reversing inner retinal remodeling."

Tracy L. Bale, PhD won the Medtronic Award given by the Society for Women's Health Research. The Medtronic Prize is given to a female scientist in her early to mid career who has devoted a significant part of her work to sex differences research and has served as a role model and mentor for both colleagues and students.



CLARKE

Dana Clarke, VMD, DAVECC, Urs Giger, DVM, PhD, MS, Bonnie Miller, BS, RDH and Deb Silverstein, DVM were invited speakers at the annual American Veterinary Medical Association Conference in August in San Diego.

Hannah Galantino-Homer, VMD, PhD, DACT was an invited participant and presenter at the Havemeyer Equine Laminitis Workshop II in Key Largo, Fla., which ran from April 29 - May 3, 2012. Dr. Galantino-Homer also lectured at the joint Annual Conference of the Society for Theriogenology and American College of Theriogenologists entitled "Endocrinopathic Laminitis and Equine Metabolic Syndrome," August 24 in Baltimore, Md. She is also serving on the American Association of Equine Practitioners Foundation Laminitis Research Committee.



HUNTER

Joana Goic, DVM earned top prize at the inaugural House Officer Research Day at Penn Vet, held on June 15. The awards for best resident presentation and best overall presentation went to Danielle Weinstein, DVM. In total, 18 residents and interns presented their findings from a variety of research projects.

Mark Haskins, VMD, MS, PhD was appointed to Chair of the Scientific Advisory Committee of the National Tay-Sachs and Allied Diseases Association.



LINARDI

Christopher A. Hunter, BSc, PhD ran an international course at Penn with approximately 180 attendees. The intensive, two-part course, taught by world-renowned immunologists, provided a comprehensive overview of the basics of immunology. This course is for students new to the discipline or those seeking more information to complement general biology or science training. The AAI Introductory Course in Immunology is sponsored by The American Association of Immunologists. In addition, Dr. Hunter served as an external examiner for a PhD at the Karolinska Institute in Stockholm and organized a Keystone Symposia on Molecular and Cellular Biology conference in February.

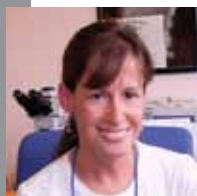
Renata Linardi, PhD was awarded a two-year fellowship from the United States Department of Agriculture - National Institute of Food and Agriculture to study "Equine lamellar organotypic culture system: A tool for laminitis research and regenerative medicine."



PERKOWSKI

Sandra Z. Perkowski, VMD, PhD, DACVA has joined Ryan Hospital as a staff veterinarian and head of the anesthesia service. Dr. Perkowski is also a certified veterinary acupuncturist.

Deborah C. Silverstein, DVM lectured at the Latin American Veterinary Emergency and Critical Care Society meeting in mid-July. In addition, Dr. Silverstein organized and spoke at the emergency and critical care portion of the American Veterinary Medical Association meeting in San Diego in August.



UTTER

Mary Lassaline Utter, DVM, PhD, DACVO was an invited speaker at the 2012 International Equine Ophthalmology Consortium in Stirling, Scotland, which took place in June.

FRANK SPEAKING AND COMMUNICATION

More than 30 years of research in medical communication demonstrates the value of implementing shared decision-making into client communication. The evidence shows improved clinical outcomes, including compliance, and increased client and veterinarian satisfaction. This aspect of clinical training has not received a great deal of attention in the veterinary school curriculum until recent years.

With that in mind, members of Penn Vet faculty participated in a workshop to facilitate the enhancement and development of a curriculum that advances mastery of communication skills by veterinary students, house officers and the faculty and staff of the teaching hospitals and diagnostic services of the School of Veterinary Medicine. The FRANK program, run by Jane Shaw at Colorado State University and Carol Barton at Pfizer with help from Erika Krick, VMD and Denise LaMarra from the Perelman School of Medicine Simulated Patient Program, introduces basic communication skills concepts and permits attendees to practice these skills through 10 case-based simulated client interactions while working in a supportive small group setting with individualized attention to learning goals. The plan is for attendees to participate in future curriculum development and teaching. One especially exciting prospect is a collaboration with the School of Medicine's Simulated Patient Program to develop simulated clients to help train our students.

PARTICIPANTS INCLUDE:

Rebecca Syring, VSEC
 Michelle Trappier (V'o8), VSEC
 Tom Garg (V'98), Animal Critical Care and Specialty Group
 Suzanne Donahue (V'99), Animal Critical Care and Specialty Group
 Ann Bastian (V'93), Valley Central Emergency Veterinary Hospital
 Barbara Dallap, Penn Vet, New Bolton Center
 David Levine, Penn Vet, New Bolton Center
 Marie-Eve Fecteau, Penn Vet, New Bolton Center
 Jeremy Wang, Penn Vet, Animal Biology
 John Lewis, Penn Vet, Ryan Hospital
 Pat Sertich, Penn Vet, New Bolton Center
 Ray Sweeney, Penn Vet, New Bolton Center
 Dan Hume, Penn Vet, Ryan Hospital
 Louise Southwood, Penn Vet, New Bolton Center
 Tamara Dobbie, Penn Vet, New Bolton Center
 Alex Hamberg, Penn Vet, Pathobiology
 Meryl Littman, Penn Vet, Ryan Hospital
 Rose Nolen-Walston, Penn Vet, New Bolton Center
 Amy Durham, Penn Vet, Pathobiology
 Helen Wheeler-Aceto, Penn Vet, New Bolton Center
 Denise Lamara, Penn, Perelman School of Medicine
 Amy Attas (V'87), Penn Vet Board of Overseers
 Mary Bryant (V'95), Merial



THE MISSION OF THE DEAN'S ALUMNI COUNCIL IS TO WORK CLOSELY WITH THE GILBERT S. KAHN DEAN OF VETERINARY MEDICINE AND OFFICE OF ALUMNI RELATIONS, ADVANCEMENT AND COMMUNICATION ON VARIOUS PROJECTS TO CONNECT ALUMNI, STUDENTS, AND THE PUBLIC TO THE PENN VET COMMUNITY FOR THE PURPOSE OF ALUMNI ENGAGEMENT AND STEWARDSHIP, COMMUNITY AMBASSADORSHIP, AND STUDENT INTERACTIONS.

An Alumni Relations Director's Perspective

The Dean's Alumni Council is gearing up for the fall season. Having been an alumnus volunteer myself for numerous years, I understand the dedication, sacrifice, and passion it takes to serve in this role in order to be a knowledgeable ambassador for the institution and a strong advocate for the voice of the alumni whom you represent.

Since my start date on July 10, I have had the pleasure of meeting many of our Dean's Alumni Council members. They come from all walks of veterinary life including small animal practice, large animal practice, academia, regulatory and industry. They travel from as far as Florida, New York, Virginia and California. Their graduation years range from 1959 to 2006. Their interests and professional experience are as vast as those of our alumni body as a whole.

I could not be more excited to be working with this Council and I look forward to carrying out many of the plans already in the works for alumni and student programs and events. The Dean's Alumni Council full-day fall meeting includes a dynamic agenda with activities to help inform members of the activities of Penn Vet in order to make them even stronger ambassadors for the school. Members will be viewing the new Penn Vet Web site, having an interactive lunch with student leaders, conducting project group meetings and hearing from a wide variety of speakers from across the school and university. The Council members will also be taking a tour of the new Penn Vet Working Dog Center and attending the White Coat Ceremony, a newer tradition for third-year VMD students.

The Dean's Alumni Council is comprised of project groups covering topics such as the class agent program, student events and fundraising, national conferences, awards, speaker's bureau, communications and social media and the Opportunity Scholarship program. As your school's new alumni director, I would like to thank these alumni volunteers for their involvement and efforts on behalf of the University of Pennsylvania School of Veterinary Medicine and we invite all of our alumni, former residents and interns to keep an eye on the new alumni newsletter for ways to get involved.

If you are interested in serving in this kind of leadership role or if you wish to nominate a fellow alumnus, please contact me directly. You can also update your email address and other contact information by emailing me at kmcmul@vet.upenn.edu. I look forward to hearing from you.

—KRISTEN MCMULLEN
DIRECTOR OF ALUMNI RELATIONS

1940s

Arthur Richards, Jr. (V '49) is the author of *Tale Wagging: Recollections of a Rural Veterinarian*, a book that reveals many of the unexpected and humorous cases that kept Dr. Richards hopping for 50 years. A long-time member of the Pennsylvania Veterinary Medical Association, he was its president in 1976 and recognized as its Veterinarian of the Year in 1977. His hospital was recognized by the American Animal Hospital Association for 38 years. Dr. Richards and his wife have five children and 10 grandchildren. He has sold his practice and retired, but continues to do relief work for various local practices.

1980s

Diane Eigner (V'80), Steven Prier (V'81), Dennis Burkett (V'84) along with **Kimberley Galligher (V'03)** were the featured speakers during the "Tails from the Trenches" Happy Hour Series. Co-hosted by the Pennsylvania Veterinary Medical Association and the Penn Veterinary Business Management Association, the program invites students to hear "tails" from practice owners on the ins and outs of owning a veterinary practice.

Lisa Handy (V'84) has written and had illustrated a humorous coffee table book called *Just For Kicks* that portrays the lighter side of equine practice. She considers it an amazingly rewarding profession, constantly filled with surprises and plenty of horse laughs – all of which are reflected with tongue firmly in cheek throughout her new book. Dr. Handy is founder and owner of Carolina Equine Clinic in Aiken, S.C. She practiced at Palm Beach Equine Clinic before performing a residency in surgery at the University of Florida.

Patricia Provost (V'85) has been named the designee to the National Board of Veterinary Medical Examiners for the American Association of Equine Practitioners. After graduation, she completed an internship in equine medicine and surgery at the University of Missouri and an equine surgical residency at Michigan State University. Dr. Provost became a Diplomate of the American College of Veterinary Surgeons in 1992. She has been a faculty member at the Tufts Cummings College of Veterinary Medicine since 1990.

1990s

Patrick Mahaney (V'99) recently wrote for the "Daily Vet" on PetMD where he shared his personal experience during 9/11 and talks about the opening of the Penn Vet Working Dog Center. Visit PetMD and search on "commemorating the 11th anniversary of 9/11" to read his posting. The Daily Vet is a log featuring veterinarians from all walks of life. Every week they tackle topics in the world of animal medicine.



In May, the Class of 1962 celebrated its 50th reunion. We apologize for excluding it from the Alumni Weekend photos in the last issue of Bellwether. Pictured left to right are: Durbin Donahue, Charles Kresge, Stephen Potkay, Allan Lavin, Elizabeth Schultz, Clyde Johnson, Dean Joan Hendricks, Joseph St. Clair and Thomas Albert.

2000s

Leslie Kuczynski, (V'06), DACVIM, recently Clyde Johnson joined the Internal Medicine Team at Metropolitan Veterinary Associates in Norristown, Pa. as an Metropolitan Veterinary Associates is a small animal specialty and emergency hospital that originated in 1986. They currently have 25 specialists in 11 different disciplines: www.Metro-Vet.com.

Dana Yard (V'10) recently joined Metropolitan Veterinary Associates & Emergency Services in Norristown, Pa, as an emergency clinician. Dr. Yard completed her internship in small animal medicine and surgery in June of 2011 at Metropolitan.

Sam Gartland, (V'14) won first place in the Student Case Competition at the Society of Theriogenology Annual Meeting in Baltimore for his presentation of a case titled "Equine Oviduct Dysfunction."

DEATHS

Dr. Lee O. Fletcher (V'62) passed away on August 10, 2012. As noted by his classmate and friend, "Lee was one of a kind." After graduating, Dr. Fletcher started his own veterinary hospital in Claremont, N.H. He had many interests including fishing, travel and going to local and regional veterinary meetings. Lee leaves behind his wife



dr. loren harrison evans

in memoriam

Dr. Evans practiced veterinary medicine as a professor of equine surgery at the University of Pennsylvania's School of Veterinary Medicine. Having graduated with honors from Washington State University, he attended veterinary school at the same university.

Subsequent to his graduation, he was awarded an internship at the University of Pennsylvania, where over the next 33 years he was promoted to full professor and earned multiple honors. In addition to his clinical accomplishments, he conducted research into chronic equine lameness and pioneered the first successful abdominal colon surgery, paving the way for saving once-doomed horses. Dr. Evans also designed many of the surgical instruments used today for cervical and rectal repairs. Students enjoyed their rotations in his clinical service and most, who were headed into equine practice, elected to repeat this chance to learn from his practical approach to clinical examination and treatment. Field trips to large breeding operations in the tri-state area, operated by Dr. Evans' clients, were an unusual opportunity coveted by all students. Famous for his unconventional therapeutic efforts, his former students credit him with bringing enthusiasm and passion to the study of equine medicine and remaining a mentor throughout their careers.

During his tenure at the University of Pennsylvania, Dr. Evans' patients included many famous race horses: Bold Ruler (sire of Secretariat), Northern Dancer, Romeo Hanover and countless others. He was called upon to lecture and perform surgery all over the world. In 1972, he was invited to the Veterinary School of Pretoria in Onderstepoort, South Africa, receiving an honorary citizenship and the high esteem of both faculty and the student body. Awards and laurels followed Dr. Evans even after his retirement from the University of Pennsylvania in 1993. In 2003, he received the Distinguished Educator Award from the American Association of Equine Practitioners, the association to which the vast majority of equine veterinarians worldwide belong.

After his retirement, Dr. Evans returned with his wife, Phyllis Evans, to his ancestral home, the Flathead Valley of Montana. Here he traded his surgical scrubs for jeans and his new vocation, cattle rancher. Although theoretically retired, he worked with the same dedication he'd given to veterinary medicine – building up a sizeable herd of cattle, sowing his own hay and doing all the things any cowboy would be expected to do.

Dr. Evans was preceded in death by his wife of 43 years, Phyllis J. Evans, and four siblings. He is survived by his daughter Rebekkah Evans and her daughter Stephanie J. Seymour; his son Barry R. Evans and his children Lauren Evans and Ryan Evans; in addition to many nieces and nephews.

CONTACTUS

Have you received a promotion, gotten married, had a baby or received an award? Have you volunteered somewhere special, moved into a new building, ventured into a new business or discovered the cure for avian flu? Please share with us all of your good news to include in the CLASS NOTES section of the *Bellwether* and the vet.upenn.edu website. All residents, interns and fellows are also invited to share!

Forward all alumni news to Kristen McMullen at kmcmul@vet.upenn.edu or write Office of Alumni Relations, 3800 Spruce Street, Suite 172 E, Philadelphia, PA 19104.



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Penn Vet is proud to print *Bellwether* magazine on FSC (Forest Stewardship Council) certified paper, which supports the growth of responsible forest management worldwide through its international standards.

calendar

NOVEMBER 2012

November 1 and 2, 2012 EQUINE SHORT COURSES

Focusing on normal and abnormal behavior of horses with topics specifically of interest to those with serious interest in horse behavior.

New Bolton Center, Kennett Square PA

November 6, 2012 *First Tuesdays Lecture Series, a free educational lecture series for horse owners and horse enthusiasts* "HEADSHAKING SYNDROME IN HORSES"

New Bolton Center, Kennett Square, PA
Presented by Dr. Joy Tomlinson

November 10, 2012 *Animal Lovers Lecture Series, a free educational lecture series for small animal owners* "BASIC FIRST AID FOR YOUR PET"

Dog Training Club of Chester Co., Exton, PA – 10 a.m.
Presented by Dr. Dana Clarke, Interventional Radiology and Critical Care

November 8 and 9, 2012 EQUINE SHORT COURSES

Focusing on normal and abnormal behavior of horses with topics specifically of interest to those with serious interest in horse behavior. "Managing the Pregnant Mare and Her Foal"

New Bolton Center, Kennett Square, PA

Thursday, November 15, 2012 *Surgical Series* "MINIMALLY INVASIVE ORTHOPEDIC AND SOFT TISSUE SURGERY"

Auletto's Catering, Deptford, NJ
Presented by Dr. Jeffrey Runge, Surgery

For more information on any of these events, please contact Darleen Coles, special events coordinator, at coles@vet.upenn.edu or 215-746-2421.

DECEMBER 2012

December 3, 2012 PENN VET ALUMNI RECEPTION AT AAEP CONVENTION

6 p.m. to 8 p.m.
Marriott Anaheim, Room: Marquis Ballroom Northwest
700 West Convention Way, Anaheim, CA

December 4, 2012 *First Tuesdays Lecture Series, a free educational lecture series for horse owners and horse enthusiasts* "THE CRITICALLY ILL FOAL"

New Bolton Center, Kennett Square, PA
Dr. Jonathan Palmer, Medicine

December 5, 2012 *Wednesday Exchange, a bi-monthly interactive professional education opportunity for primary care veterinarians* "DIABETES, DKA AND INSULIN PRODUCTS"

Philadelphia, PA
Presented by Dr. Rebecka Hess, Internal Medicine

December 8, 2012 *Animal Lovers Lecture Series, a free educational lecture series for small animal owners* "CARING FOR YOUR AGING PET"

Penn Med at Radnor, Radnor, PA
Presented by Dr. Ann Caufield, Clinician, Rehabilitation Medicine

JANUARY 2013

January 12, 2013 *Animal Lovers Lecture Series, a free educational lecture series for small animal owners* "CARING FOR YOUR FURRY, FEATHERED OR SCALED PET"

Hill Pavilion – Penn Vet, Philadelphia, PA
Presented by Dr. Nicole Wyre, Chief of Service, and Dr. La'Toya Latney, Lecturer, Exotic Companion Animal Medicine and Surgery

January 21, 2013 NORTH AMERICAN VETERINARY CONFERENCE

Penn Vet Alumni Reception
Orlando, FL